2004 DOE Hydrogen, Fuel Cells & Infrastructure Technologies Program Review Presentation Template

(replace with your title)

Name

Organization

Date

Objectives

- Describe the objective of your project and what you were to achieve for the work covered by your presentation, i.e., the objective of your work over the past year

Example Objectives Slide

Project Objectives

To assist DOE in the development of fuel cell system technologies by providing cost and manufacturing analysis.

- To develop an independent cost estimate of PEMFC system costs including a sensitivity analysis to:
  - Operating parameters
  - Materials of construction
  - Manufacturing processes
- To identify opportunities for system cost reduction through breakthroughs in component and manufacturing technology
- To provide annual updates to the cost estimate for the duration of the project

Budget

- Total funding for the project (if applicable)
- Split out DOE and Contractor share (if applicable)
- Funding in FY03

Technical Barriers and Targets

- List the technical barriers and technical targets from the HFCIT Program Multi-Year Program Plan addressed by your project (If you do not have them, go to www.eere.energy.gov/hydrogenandfuelcells/mypp to obtain them)

Example Technical Barriers and Targets Slide

- DOE Technical Barriers for Fuel Cell Components
  - O. Stack Material and Manufacturing Cost
  - P. Durability
  - Q. Electrode Performance
  - R. Thermal and Water Management
- DOE Technical Target for Fuel Cell Stack System for 2010
  - Cost $35/kW
  - Durability 5000 hours

Approach

- Describe overall technical approach using one slide
- Use simple statements so that scientists and engineers not expert in your area can readily understand the explanation of your approach

Example Approach Slide

2. Approach

- Development of energy-efficient, high-temperature, regenerative, solid-oxide electrolyser cells (SOECs) for hydrogen production from steam.
  - Reduce ohmic losses to improve energy efficiency
  - increase SOEC durability and sealing with regard to thermal cycles
  - minimize electrolyte thickness
  - improve material durability in a hydrogen/oxygen/steam environment
  - Develop and test integrated SOEC stacks operating in the electrolysis mode
- Specification and testing of hydrogen-permeation-resistant materials for a high-temperature heat exchanger

Project Safety

- Please provide a brief bullet list for your presentation of safety aspects of this project

Example Project Safety Slide

- Identification of safety vulnerability techniques used in the analysis of the design and operation of equipment, e.g. hazard and operability study (HAZOP), failure mode and effects analysis (FMEA), others
- Identification of management of change (MOC) process used for the project, briefly describing procedures for changes in chemicals, technology, equipment, and operations
- Any safety-related lessons learned from the project
- Other safety-related insights benefiting the project and/or of potential application to other projects

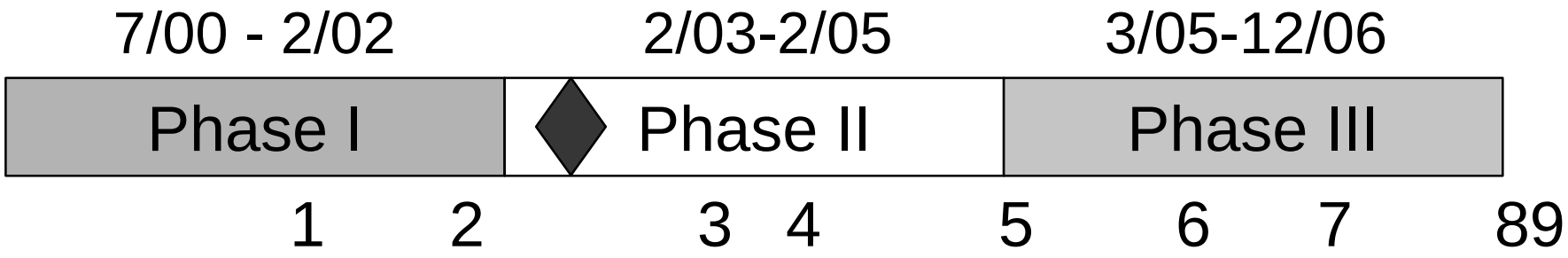
Project Timeline

Use a graph rather than text

When did the project start?
Where/when are the major milestones?
What are the success criteria and when you anticipate meeting them?
When does the project end?

During your presentation, description of the timeline should be extremely brief!

Example Project Timeline Slide



- Phase I - Feasibility
  1. Selected Two-Stage Process with Pd Membrane
  2. Assessed Economics Vs. Current Options
- Phase II - Hydrogen Membrane Development
  3. Select Alloy and Substrate
  4. Membrane Production and Testing
  5. Verify Reactor Performance and Update Process Economics
- Phase III - System Design and Testing
  6. Design (DFMA Focus) and Fabricate Multi-Tube Pilot Unit
  7. Operate Pilot Unit
  8. Verify System Performance and Update Process Economics
  9. Develop Commercial Offering

Technical Accomplishments/Progress

- Describe the most important accomplishments achieved during this reporting period
- Relate the accomplishments to project milestones
- Benchmark the accomplishments against the technical targets (if possible)

Accomplishments/Progress Slides

- Include sufficient slides to explain what was done leading to the technical accomplishments
- Please limit your slides to the time you have available – you will not be allowed to go over your allotted time

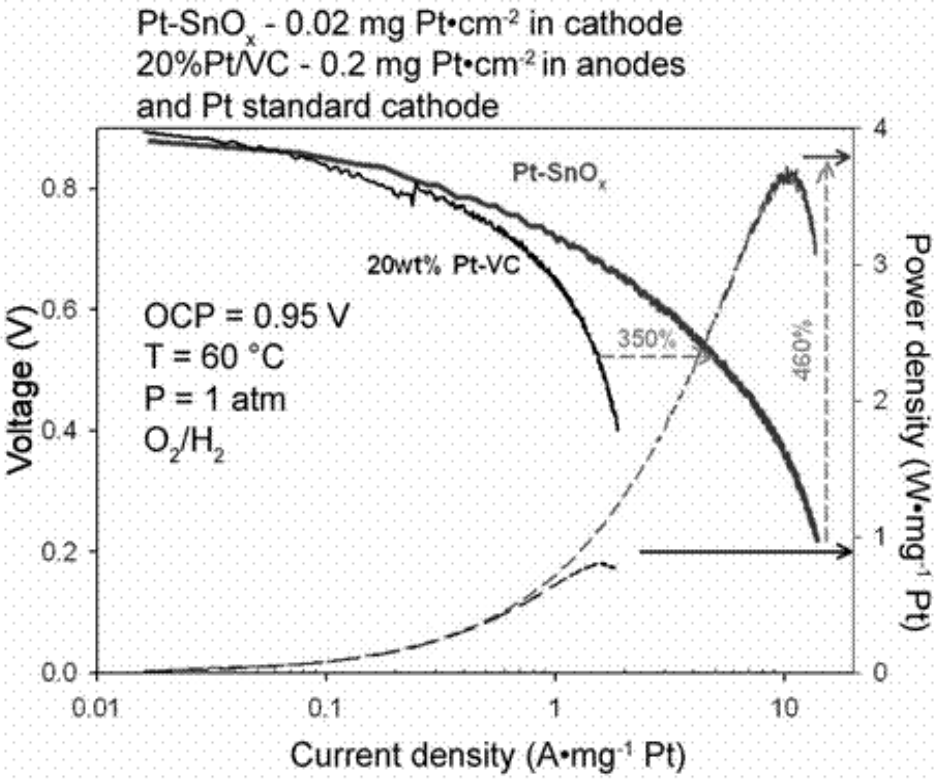
Accomplishments Slides (con't)

- To assist the reviewers evaluate your work, please include bullet comments of the key points on each slide
- Though your presentation will be in color, it is best to choose colors and data symbols so that they can be easily distinguished in black and white for those reviewers with hardcopies

Example Technical Accomplishments Slide

Pt-SnO_x cathode performance in a PEMFC

- Fuel cell performance of Pt-SnO_x is 3.5× better per wt% Pt in first-generation MEAs
- Improvements needed in MEAs (e.g., thinner catalysts layers)
- Performance at 80°C same as that at 60°C - under investigation



Interactions and Collaborations

- Explain your interactions with private and public partnerships to leverage the resources of this project (omit this slide if you do not have any)
- Include knowledge and technology transfer activities

Example Interactions and Collaborations Slide

Interactions & Collaborations

University of WA: Dr. Phil Malte - injector and burner design project; laser-based determinations of fuel evaporation and mixing.

WA State University: Prof. Pat Pedro - plasma catalyst deposition

PNNL: Larry Pederson - micro-channel heat exchangers; EMSL – catalyst characterization

Micro-Fabricators: working with several commercial partners

Irving, P. M., Q. Ming, and D.R. Stephens, "Development of a Fuel Processor that Generates Hydrogen from Conventional Fuels", In: Proceedings of the 14th Annual U.S. Hydrogen Meeting, March 4-6, 2003, Washington DC.

Irving, P.M., "Novel Catalytic Fuel Reforming", Global Climate Energy Project, April 14-15, 2003, Stanford University.

Responses to Previous Year Reviewers' Comments

- If yours is an on-going project that was reviewed last year, address 1-3 significant questions/criticisms from the previous year's reviewers' comments

Example Response to Reviewers' comments Slide

Reviewers' Comments

Focus on dynamic model development and issues of transients, turndown ratio, start-up.

- Will present results on transient response & cold-start of H_2 FC systems
- Assisted project on fast start of gasoline fuel processors
- Filed a patent on load-following fuel processors

More interactions with FreedomCAR Fuel Cell, Systems Analysis, and Energy Storage Tech Teams.

- Supported setting of targets for air management system.
- Supported setting of H_2 storage targets
- Participating in hybridization study.

Emphasize code development.

- Developed dynamic models of catalytic reactors, CEMM, heat rejection system, water management system .....

Future Work

- Explain what it is you plan to do during the next year, what milestones are upcoming, how you will deal with any decision points during that time, any remaining issues

Example Future Work Slide

Future Plans

- Remainder of FY 2003:
  - Carbon formation:
    - Sulfur effect on carbon formation
    - Oxidative regenerative of catalyst
  - Fuel reforming and hydrogen fuel cell durability testing
    - Implement drive cycle testing into durability testing

- FY 2004:
  - Hydrogen / gasoline reformate durability comparison
    - Implementation of drive cycle including start-up cycling on fuel processor
  - Carbon formation fundamentals
    - Kinetic expressions and mechanistic studies of carbon formation
  - Strategies for controlling carbon formation
    - Avoidance and minimization of carbon formation
    - Oxidative regeneration of catalyst
  - Characterization of start-up emissions
    - Contaminant and hydrocarbon breakthrough